Techniques for genetically engineering plant cells and/or tissue with an expression cassette comprising a constitutive promoter or an inducible promoter or chimeric promoter fused to a heterologous coding sequence and a transcription termination sequence are to be introduced into the plant cell or tissue by *Agrobacterium*-mediated transformation, electroporation, microinjection, particle bombardment or other techniques known to the art. The expression cassette advantageously further contains a marker allowing selection of the heterologous DNA in the plant cell, e.g., a gene carrying resistance to an antibiotic such as kanamycin, hygromycin, gentamycin, or bleomycin.

A DNA construct carrying a plant-expressible gene or other DNA of interest can be inserted into the genome of a plant by any suitable method. Such methods may involve, for example, the use of liposomes, electroporation, diffusion, particle bombardment, microinjection, gene gun, chemicals that increase free DNA uptake, e.g., calcium phosphate coprecipitation, viral vectors, and other techniques practiced in the art. Suitable plant transformation vectors include those derived from a Ti plasmid of *Agrobacterium tumefaciens*, such as those disclosed by Herrera-Estrella (1983), Bevan (1983), Klee (1985) and EPO publication 120,516 (Schilperoort et al.). In addition to plant transformation vectors derived from the Ti or root-inducing (Ri) plasmids of *Agrobacterium*, alternative methods can be used to insert the DNA constructs of this invention into plant cells.

The choice of vector in which the DNA of interest is operatively linked depends directly, as is well known in the art, on the functional properties desired, e.g., replication, protein expression, and the host cell to be transformed, these being limitations inherent in the art of constructing recombinant DNA molecules. The vector desirably includes a prokaryotic replicon, i.e., a DNA sequence having the ability to direct autonomous replication and maintenance of the recombinant DNA molecule extra-chromosomally when introduced into a prokaryotic host cell, such as a bacterial host cell. Such replicons are well known in the art. In addition, preferred embodiments that include a prokaryotic replicon also include a gene whose expression confers a selective advantage, such as a drug resistance, to the bacterial host cell when introduced into those transformed cells. Typical bacterial drug resistance genes are those that confer resistance to ampicillin or tetracycline, among other selective agents. The

neomycin phosphotransferase gene has the advantage that it is expressed in eukaryotic as well as prokaryotic cells.

Those vectors that include a prokaryotic replicon also typically include convenient restriction sites for insertion of a recombinant DNA molecule of the present invention. Typical of such vector plasmids are pUC8, pUC9, pBR322, and pBR329 available from BioRad Laboratories (Richmond, CA) and pPL, pK and K223 available from Pharmacia Biotech (Uppsala, Sweden), and pBLUESCRIPT and pBS available from Stratagene (La Jolla, CA). A vector of the present invention may also be a Lambda phage vector including those Lambda vectors described in *Molecular Cloning: A Laboratory Manual, Second Edition,* Maniatis et al., eds., Cold Spring Harbor Press (1989) and the Lambda ZAP vectors available from Stratagene (La Jolla, CA). Other exemplary vectors include pCMU [Nilsson et al. (1989) *Cell* **58**:707]. Other appropriate vectors may also be synthesized, according to known methods; for example, vectors pCMU/K^b and pCMUII used in various applications herein are modifications of pCMUIV (Nilson et al., supra).

Typical expression vectors capable of expressing a recombinant nucleic acid sequence in plant cells and capable of directing stable integration within the host plant cell include vectors derived from the tumor-inducing (Ti) plasmid of *Agrobacterium tumefaciens* described by Rogers et al. (1987) *Meth. in Enzymol.* **153**:253-277, and several other expression vector systems known to function in plants. See for example, Verma et al., No. WO87/00551; Cocking and Davey (1987) *Science* **236**:1259-1262.

A transgenic plant can be produced by any means known to the art, including but not limited to *Agrobacterium tumefaciens*-mediated DNA transfer, preferably with a disarmed T-DNA vector, electroporation, direct DNA transfer, and particle bombardment (See Davey et al. (1989) *Plant Mol. Biol.* **13**:275; Walden and Schell (1990) *Eur. J. Biochem.* **192**:563; Joersbo and Burnstedt (1991) *Physiol. Plant.* **81**:256; Potrykus (1991) *Annu. Rev. Plant Physiol. Plant Mol. Biol.* **42**:205; Gasser and Fraley (1989) *Science* **244**:1293; Leemans (1993) *Bio/Technology.* **11**:522; Beck et al. (1993) *Bio/Technology.* **11**:1524; Koziel et al. (1993) *Bio/Technology.* **11**:194; and Vasil et al. (1993) *Bio/Technology.* **11**:1533). Techniques are

well-known to the art for the introduction of DNA into monocots as well as dicots, as are the techniques for culturing such plant tissues and regenerating those tissues.

For use in pseudomonads and many other Gram negative bacteria, IncQ or IncP vectors are particularly appropriate, and a large variety of such vectors are known in the art. For use in Gram positive bacteria any of a number of vectors maintained and replicated in particular organisms of interest, especially *Bacillus subtilis* and other species, are well known and readily available to the art. See, e.g., Pouwels, P.H. et al. (eds.) *Cloning Vectors*, Elsevier, Amsterdam, NL. Vectors suitable for use in filamentous fungi such as Aspergillus and Trichoderma are known as are vectors for use in yeasts including *Saccharomyces cerevisiae* and *Pichia pastoris*. The *merOP* regulatory region and the MerR coding sequence are desirably inserted into the vector of choice according to the desired host cell so that MerR or chelon expression is turned on only in the presence of mercury.

Polyclonal and/or monoclonal antibodies capable of specifically binding to a chelon of the present invention are provided. The term antibody is used to refer both to a homogenous molecular entity, or a mixture such as a serum product made up of a plurality of different molecular entities. Monoclonal or polyclonal antibodies specifically reacting with a chelon of the present invention can be made by methods known in the art. See, e.g., Harlow and Lane (1988) *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratories; Goding (1986) *Monoclonal Antibodies: Principles and Practice*, 2d ed., Academic Press, New York. Also, recombinant immunoglobulins may be produced by methods known in the art, including but not limited to, the methods described in U.S. Patent No. 4,816,567. Monoclonal antibodies with affinities of 10^8 M^{-1}, preferably 10^9 to 10^{10} or more are preferred.

Antibodies specific for the artificial metal binding proteins (chelons) of the present invention are useful, for example, as probes for assessing expression, for determining amounts of artificial binding proteins in free or bound form or for detecting the presence of the artificial metal binding proteins of the present invention in a test sample. Frequently, the polypeptides and antibodies will be labeled by joining, either covalently or noncovalently, a substance which provides a detectable signal. Suitable labels include but are not limited to